

**JPRS 76439**

**17 September 1980**

# **USSR Report**

**LIFE SCIENCES**

**BIOMEDICAL AND BEHAVIORAL SCIENCES**

**No. 4**

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17 September 1980

USSR REPORT  
LIFE SCIENCES  
BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 4

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CLONING AND EXPRESSION OF A CHEMICALLY SYNTHESIZED BRADYKININ GENE IN BACTERIA

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 250, No 1, 1980 pp 208-212

GORODETSKIY, S. I., KAPELINSKAYA, T. V., LISENKOV, A. F., SLYUSARENKO, A. G., and Academician DUBININ, N. P., Institute of General Genetics, USSR Academy of Sciences, Moscow

[Abstract] Genetic engineering experiments were undertaken in which a chemically synthesized bradykinin gene was incorporated into a plasmid vector for expression in *E. coli*. The vector, designed as plasmid pL-1, was created from plasmid pBR 322 and a 4.4 megadalton EcoRI fragment of phage lambda-plac5 DNA which contained a portion of the lac operon and most of the beta-galactosidase gene. DNA from pL-1 was subsequently sequentially treated with Bam HI and EcoRI restrictases, mixed with the synthetic bradykinin gene, and the mixture incubated with T4 DNA ligase. The product was used for the transformation of *E. coli* HB 101 which yielded a clone, designated as carrying plasmid pLB55, in which transcription of the lac fragment proceeded toward the bradykinin gene and which also showed constitutive beta galactosidase synthesis. Radioimmunoassay studies established that *E. coli* HB 101/pLB 55 synthesized biologically active bradykinin (rat uterine horn contraction) which represented 0.02-0.05% of total cellular protein, providing a bradykinin yield of 1 mg per 25 g of cells. Figures 3; references 9: 2 Russian, 7 Western.

[198-12172]



## CLONING OF THREONINE OPERON GENES IN E. COLI CELLS

Moscow GENETIKA in Russian No 1, 1980 pp 66-77

KOZLOV, Yu. I., KOCHETOVA, L. P., LIVSHITS, V. A., MASHKO, S. V., MOSHENTSEVA, V. N., REBENTISH, B. A., ROZINOV, M. N., KHURGES, Ye. M., YANKOVSKIY, N. K., and DEBABOV, V. G., All-Union Scientific Research Institute of Genetics and Breeding of Industrial Microorganisms, Moscow

[Abstract] Standard methods of genetic engineering were employed in preparing hybrid plasmids, using the plasmid pBR322 as a vehicle, which contained the E. coli threonine operon genes and were subsequently used in the transformation of various E. coli strains to evaluate the expression of these extrachromosomal genes. Genetic and restriction analyses demonstrated that the cloned chromosomal fragment contained the thrA and thrB genes on a 2.8 megadalton DNA segment between SalGI and EcoRI restriction sites. Furthermore, the number of hybrid plasmids per bacterial cell was inversely proportional to its molecular weight and independent of the number of replicons in the plasmid. Plasmid mediated amplification of the threonine operon genes resulted in a 20 to 50-fold increase in homoserine dehydrogenase activity, a product of the thrA gene. In addition, the threonine genes on the plasmid are subject to repression by the end products (threonine and isoleucine) in the same manner as the threonine genes on the bacterial chromosome. Tables 4; figures 4; references 27: 1 Russian, 26 Western.  
[245-12172]

UDC 577.213.3

## DETERMINATION OF DNA CYTOSINE METHYLASE (M-Eco MRE 600 I) BY A PLASMID OF Col A

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 250, No 5, 1980 pp 1265-1267 manuscript received 28 Nov 79

NESTERENKO, V. F., BUR'YANOV, Ya. N. and BAYEV, A. A., Pushchino, Moscow Oblast, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences

[Abstract] E. coli MRE 600 cells differ from other known E. coli strains by containing two sites of specific cytosinic DNA methylases: M-Eco MRE 600 I and M-Eco MRE 600 II. The DNA methylase M-Eco MRE 600 II belongs in the Eco RII type of DNA methylases which is fairly common among strains of E. coli and other bacteria, whereas M-Eco MRE 600 I is unique both in the specificity of recognizable sequence and in its spread among bacteria. Since the cells

of *E. coli* MRE 600 contain several plasmids, it can be assumed that the DNA methylase Eco MRE 600 I is coded by one of these plasmids. This assumption was verified by using a mutant that is thermosensitive to replication: the mutant pEGI [Ap Tc Rep (Ts)] of the R-factor RP4 (Inc Ap Tc Km). The factor RP4 and its mutant carry the transposone Tn1 which determines resistance to ampicillin. The donors of Tn1 were cells of *E. coli* C 600, and the recipients, cells of *E. coli* MRE 600 Str<sup>7</sup>. The conjugation was performed at 30°C, with subsequent isolation of the plasmids and their identification by means of DNA electrophoresis. The plasmids pBS 101, pBS 102, and pBS 103 were isolated. The fourth plasmid pBS 104 could not be detected. It was established that M·Eco MRE 600 I is coded by the plasmid pBS 103 and that the colicin determined by that plasmid is of the colicin A type. The plasmid pBS 103 is present in the amount of several tens of copies per cell. This plasmid may find application in genetic engineering. References 15: 8 Russian, 7 Western.

[244-1386]

UDC 576.851.45.095.57.083.3

#### PROPERTIES OF REVERTANTS OF THE PLAGUE MICROBE, OBTAINED FROM L-FORMS

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 11, 1979 pp 101-102 manuscript received 16 Mar 1979

DUNAYEV, G. S., ZYKIN, L. F., PROZORSKIY, S. V., METLIN, V. N., and KOSTYUKOVSKIY, V. M., The Volgograd Scientific Research Anti-Plague Institute, and the Gamaleya Institute of Epidemiology and Microbiology, USSR Academy of Medical Sciences, Moscow

[Abstract] Comparative studies were made of plague microbe strains and revertants of the L-form from the twentieth passage obtained by transplanting from semiliquid agar without penicillin to Hottinger agar with sodium sulfite. Morphological variations, growth rates, biochemical activity pigment production, calcium dependency and relationships to bacteriophages and the antigen structure yielded data that led to several clear conclusions concerning differences between the revertants and the original microbes, in most strains. Fluorescence, present in many original microbe strains, was weaker or absent in the revertants. The revertants also lost the ability to produce certain types of antigen fractions.

[187-12131]

## ISOLATION OF AN ARBOVIRUS ANTIGENICALLY RELATED TO THE ISSYK-KUL VIRUS

Moscow VOPROSY VIRUSOLOGII in Russian No 1, 1980 pp 61-62

L'VOV, D. K., KOSTYUKOV, M. A., PAK, T. P., and GROMASHEVSKIY, V. L., Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow, and the Dushanbe Institute of Epidemiology and Hygiene, Tajik SSR Ministry of Health, Dushanbe

[Abstract] A research worker collecting bats in the Kumsangirskiy Rayon in Southern Tajikistan during the summer fell ill 5 days later, suffering from chills, headache, weakness, and muscular pain. Blood inoculation of the brains of suckling mice eventually yielded a virus antigenically related to the Issyk-Kul virus, and serologic studies on the patient showed the appearance of complement fixing antibodies on day 20 (1:32). The titer subsequently showed a progressive fall: day 40--1:16; day 68--1:8; and day 103--0. Neutralizing antibodies first appeared on day 40 with a neutralizing index of 3.0. The virus in question was identified as strain K-1165 T and underlined the possibility of summer-time infections with the Issyk-Kul viruses. Tables 1; figures 1; references 4: 1 Western, 3 Russian.  
[296-12172]

## CONDITIONS OF IN VITRO ENTEROTOXIN PRODUCTION BY CL PERFRINGENS, TYPE A

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 11, 1979 pp 98-100 manuscript received 27 Nov 78

BAKULIN, I. N., ZEMLYANITSKAYA, Ye. P., and SERGEYEVA, T. I., The Gamaleya Institute of Epidemiology and Microbiology, USSR Academy of Medical Sciences, Moscow

[Abstract] The dynamics of spore and enterotoxin formation were studied using Duncan-Strong medium for Cl perfringens spore production by replacing proteo-zopeptone with bacto-peptone, and processing 40 strains of the Type A Cl. perfringens. The native enterotoxin was then extracted in an ultrasound disintegrator. After centrifugation, the supernatant was administered to white mice. Intracellular enterotoxin was shown to be lethal to white mice when injected intravenously, while it had an erythematous activity in guinea pigs and caused fluid retention in the intestines of rabbits.  
[187-12131]

## SYNCHROTRON RADIATION AND ITS USE IN BIOLOGY

Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian Vol 32, No 11, 1979 pp 1053-1063 manuscript received 30 Oct 79

AVAKYAN, T. M., GEVORKYAN, S. G., KARAGEZIAN, A. S. and KORKHMAZYAN, M. M., Yerevan Physics Institute, State Committee for the Use of Atomic Energy, Laboratory of Radiation Biophysics, Chair of Cytology, Yerevan State University

[Abstract] The aim of the present review was to present the uses of synchrotron radiation in solid state physics, biology and medicine, and, in particular, the recent achievements in its application to molecular biology and its further prospects. Special attention was given to applications of the EXAFS (extended x-ray absorption fine structure) method and to its recent successful use in structural investigations in biology, chemistry and solid state physics. In 1972, the Yerevan synchrotron was used (for the first time in the USSR) to obtain diffraction patterns of frog muscle, and, furthermore, was made available to workers of the Institute of Nuclear Physics of the Siberian Branch of the USSR Academy of Sciences and of the Institute of Biophysics to be used in investigating structural transformations in biological objects with the aid of a VEPP-3 storage beam. In 1976-1978, also for the first time, a channel of synchrotron radiation of the Yerevan circular accelerator, was used in experiments on the biological effects of synchrotron radiation on plant chromosomal apparatus and animal DNA. Tables 2; references 35: 14 Russian, 25 Western. [314-1015]

## THEORETICAL MODEL OF POLARIZED LIGHT ORIENTATION (POLAROTAXIS)

Kiev VESTNIK ZOOLOGII in Russian No 5, Sep/Oct 79 pp 3-10 manuscript received 11 Apr 79

FRANTSEVICH, L. I., Institute of Zoology, Ukrainian SSR Academy of Sciences

[Abstract] Certain species with compound eyes perceive polarized light because of the rhabdomeric construction of their photoreceptors, in which a large part of the rhabdomere cell membrane is disposed tangentially to incoming light. On the basis of this phenomenon, a theory was devised to

account for polarized light orientation (polarotaxis), which essentially assumed that orientation rests on a comparison of the actual sky polarization pattern with a standard pattern inherent in the structure of the compound eye. The standard or null direction of polarization in every ommatidium coincides with the position of microvilli in a polarization sensitive photoreceptor, and deviation between the standard and null directions of polarization at a given point in the visual field provides an estimate of angular deviation between the axis of the body and the sun's position. Figures 4; references 14: 5 Russian, 9 Western.  
[90-12172]

UDC 576.895.771.095.18:615.332

**EFFECT OF PHYTOBACTERIOMYCIN AND COMPONENT STREPTOTHRICINS ON LARVAE OF CULEX PIPIENS MOLESTUS FORSK. MOSQUITOES AND PHYTOPATHOGENIC BACTERIA**

Moscow MEDITSINSKAYA PARAZITOLOGIYA in Russian No 1, 1980 pp 52-55 manuscript received 2 Jan 79

GANUSHKINA, L. A., MAKAROVA, G. Ya., and CHAGIN, K. P., Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martainovskiy, USSR Ministry of Health; All-Union Scientific Research Institute of Microbiological Agents for Protection of Plants and Bacterial Products, Main Administration of the Microbiological Industry under the USSR Council of Ministers, Moscow

[Abstract] Previous studies demonstrating the toxicity of PBM [phytobacteriomyacin, a Soviet antibiotic used for control of bacterial and fungal plant diseases] served as the basis to make a comparative study of the effects of PBM and streptothricin components thereof on mosquito larvae and phytopathogenic bacteria. PBM containing different amounts of streptothricins were tested in model experiments on mosquito larvae and nine bacterial species, using the method of serial dilutions in beef-extract broth. The results were tabulated according to species, bacteriostatic and bactericidal effects on phytopathogenic bacteria; effect of PBM on larvae was plotted: percentage of larval death as a function of duration of experiment. Figures 2; references 10 Russian.  
[276-10,657]



## BIOLOGICAL BASIS OF CONTROL OF BEHAVIOR IN BIRDS. 2: ANSERIFORMES.

Moscow ZOOLOGICHESKIY ZHURNAL in Russian No 8, Aug 79 pp 1172-1182

IL'ICHEV, V. P., and TIKHONOV, A. B., Institute of Evolutionary Morphology and Ecology, USSR Academy of Sciences (Moscow), and Biological Faculty, Moscow State University

[Abstract] Research reported earlier with regard to the Galliformes is now extended to the Anseriformes. It is found that subjecting the chicks of various species to artificially-produced chirping sounds of the same frequency but with a rate of occurrence 1.5-2 times as great as their own chirping sounds during hatching both speeds up the hatching process and leads to greater synchrony in the hatching of different individuals. The summoning and warning sounds made by the mother are investigated and sonograms presented for various species. Day-old chicks respond to the summoning noise readily, but it appears that behavior in response to the alarm sounds must be learned through contact with the parents. The comfort and discomfort noises made by the chicks are analyzed and sonograms presented. It is found that laboratory-raised chicks have a tendency to make alarm noises at inappropriate times, in contrast to those which have had initial contact with the mother bird.

[20-8480]

UDC 615.9:613.6

DOSAGE OF SUBSTANCES FOR MAMMALS BASED ON BIOLOGICAL ACTIVITY CONSTANTS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 247, No 6, 1979 pp 1513-1516 manuscript received 19 Feb 79

RYBOLOVLEV, Yu. R. and RYBOLOVLEV, R. S., Central Scientific Research Institute of Hematology and Blood Transfusion, Moscow

[Abstract] This article seeks to identify a criterion for translating dosage data from one species to another, e.g., rabbit to man. The isoeffective doses of drugs and poisons for different species of mammals, including man, differ with respect to the species; when the isoeffective doses of a substance are administered, the concentration of the substance in the blood of experimental animals and man is the same. Concentration in the blood is a function of mutually opposite actions, intake and elimination, and different species differ quantitatively in elimination. A table is presented of indices which define species tolerance of chemical substances; these include body weight, brain weight, basal metabolism, cardiac output and various constants (for each species) calculated from these indices. A controlling pharmacological property of a substance is the value  $t_{0.5}$ , which is numerically equal to the time within which its concentration in the blood is halved. On the basis of all of the indices cited--for selected pharmaceuticals and the respective species--a biological activity constant,  $K_a$ , is derived mathematically; expression of  $K_a$  uses terms which relate to volume of cardiac activity and body and brain weight ratio. Values of  $K_a$ , with reference to veronal, are calculated for mice, rats, rabbits, cats and dogs. Effective, non-lethal, dosages may be predicted on the value of the  $K_a$  for the respective species. References 14: 6 Russian, 8 Western.  
[14-8586]

## CLINICAL ASPECTS OF DOMESTIC POISONING AND PATHOGENESIS OF INTOXICATION WITH ORGANOPHOSPHORUS ANTICHOLINESTERASES

Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 11, Nov 79 pp 37-40

BADYUGIN, I. S., dotsent, colonel of the medical service, TOTOVA, N. N., candidate of medical sciences, KHAMITOVA, R. Ya. and MAKAROV, N. Ya., candidate of medical sciences, major of the medical service

[Abstract] This is a continuation of earlier work on organophosphorus (OP) anticholinesterases (this journal, No 4, 1979) where non-specific mechanisms of OP compounds were examined experimentally. In the present article, an analysis is made of patterns of occurrence of non-specific complications and sequelae in patients who had suffered common everyday poisoning by OP compounds, viz., chlorofos and dichlofos. Poisoning cases were due to ingestion (90%), inhalation (8%) and percutaneous absorption (2%); mild poisoning (39%), moderate (35%) and severe (26%) poisonings were seen. Death occurred in 7.8% of the cases. The specific action of the OP compounds as a stimulant of the cholinergic system are noted; the muscarinic or nicotinic syndromes are tabulated. A schematic chart of the pathogenesis of OP intoxication is illustrated. Discussion of the nature of the poisonous action is presented, and a pedagogic-type review of the findings of other investigators (Shcherbakov, 1972; Smirnova, 1972; Luzhnikov, 1975; Augustinsohn and Nachmanson, 1949) is made to clarify the subject. Two basic pathological processes are seen to occur: 1) an acute irritation of the cholinergic system, and, 2) a precipitously-developing, dystrophic disturbance in the internal organs and nervous system. Reference 1 (Russian, as a footnote).

[145-8586]

## NEW PROTECTIVE SOLUTION 'HEMGEL' USED IN FREEZING BONE MARROW CELLS

Moscow PROBLEMY GEMATOLOGII I PERELIVANIYA KROVI in Russian No 1, 1980 pp 21-26 manuscript received 24 Jan 79

SHISHKINA, I. D., FEDOTENKOV, Prof A. G., DANILOVA, L. A., and TIMAKOVA, L. A., Laboratory of Preservation of Bone Marrow and Other Hemopoietic Tissues (headed by Prof A. G. Fedotenkov), Central Institute of Hematology and Blood Transfusion (director: Prof O. K. Gavrilov, corresponding member of the USSR Academy of Medical Sciences), USSR Ministry of Health, Moscow

[Abstract] A new cryoprotective solution, named hemgel, was developed for use with bone marrow cells to be frozen; it consists of the following: saline, hemodes (a blood substitute containing saline, 6% polyvinyl-pyrrolidone and sodium, potassium, calcium, magnesium and chloride ions); 10% gelatin solution, glycerin, low-molecular polyvinylpyrrolidone, average [medium?] sodium citrate and disodium salt of ethylenediaminetetraacetic acid. Preliminary experiments on animals showed it to be non-toxic, apyrogenic and nonallergenic. Experiments on frozen hemopoietic tissue from mice showed that hemgel preserved 60% of the stem cells. Studies were also made of its effect on bone marrow of healthy humans without freezing, as well as with freezing and thawing. A two-stage method was elaborated for freezing donor bone marrow with hemgel: 1) cooling at the rate of 1° per min from room temperature to -9°C, then 10°/min to -185°C, the entire process taking 42-45 min. Testing revealed that the use of hemgel made it possible to use a simpler method for freezing bone marrow suitable for clinical use for the first 10-12 h after thawing. Figures 4; references 4: 2 Russian, 2 Western. [220-10,657]

## COMPARATIVE CHARACTERISTICS OF ERYTHROCYTE SUSPENSIONS CONTAINING DIFFERENT PLASMA SUBSTITUTES

Moscow: PROBLEMY GEMATOLOGII I PERELIVANIYA KROVI in Russian No 1, 1980 pp 11-15 manuscript received 26 Jun 78

POLYAKOVA, L. P., AGRANENKO, Prof V. A., SUVOROVA, I. A., GOLUBEVA, V. I., BORZOVA, L. V., RYAPOLOVA, I. V., ICHALOVSKAYA, T. A., OVNATANOVA, M. S., VINOGRADOV, V. L., KOZINETS, Prof G. I., and UMNOVA, Prof M. A., Department of Blood Preservation and Transfusiology (headed by Prof V. A. Agranenko) and Laboratory of Hemocytology and Experimental Chemotherapy of Leukemia (headed by Prof G. I. Kozinets), Central Institute of Hematology and Blood Transfusion (director: Prof O. K. Gavrilov, corresponding member of the USSR Academy of Medical Sciences), USSR Ministry of Health, Moscow

[Abstract] A comparative study was made in vitro of effects of addition of rheopolyglucin [rheomacrodex, 10% solution of low molecular dextran in isotonic sodium chloride solution], lactasole (without addition of calcium) and saline to erythrocytes on properties of the latter. The various parameters with use of rheopolyglucin and saline (hematocrit, free hemoglobin, relative viscosity, pH, aggregation of erythrocytes, etc.) are tabulated. It was concluded that rheopolyglucin can be used with erythrocytes as a transfusion medium with a very good therapeutic response. Figures 2; references: 5 Russian.  
[220-10,657]



OXYGEN TRANSPORT AND CARDIOVASCULAR FUNCTION AFTER TOTAL BLOOD REPLACEMENT  
WITH SOLUTIONS OF CHEMICALLY MODIFIED HEMOGLOBIN: POLYHEMOGLOBIN AND  
POLYHEMOGLOBINALBUMIN

Moscow PROBLEM GEMATOLOGII I PERELIVANIYA KROVI in Russian No 1, 1980 pp 29-  
32 manuscript received 21 Feb 79

YAROCHKIN, V. S., KOZINER, V. B., doctor of medical sciences; ZEYNALOV, A. M.,  
AZHIGIROVA, M. A., and VYAZOVA, Ye. P., Laboratory of Pathological Physiology  
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Prof O. K. Gavrilov, corresponding member of the USSR Academy of Medical  
Sciences), USSR Ministry of Health, Moscow

[Abstract] Experiments were conducted on anesthetized cats to determine how  
oxygen transport by Hb and hemodynamics are affected by exchange transfusions,  
with replacement of blood by polyhemoglobin and polyhemoglobinalbumin (com-  
pounds in which the Hb molecule was enlarged by polymerization and binding  
with albumin, respectively, which were developed by G. Ya. Rozenberg et al.).  
Both Hb polymers are well oxygenated in the lungs, but give off oxygen to  
tissues less well than Hb contained in erythrocytes, and further studies are  
needed to explore the possibility of overcoming the latter. Figures 5; ref-  
erences 10: 3 Russian, 7 Western.  
[220-10,657]

## USE OF BIOLOGICAL GLUE IN TYMPANOPLASTY

Moscow VESTNIK OTORINOLARINGOLOGII in Russian No 1, 1980 pp 8-12 manuscript received 28 Mar 79

PREOBRAZHENSKIY, A. N., academician of the USSR Academy of Medical Sciences, and GOL'DMAN, I. I., candidate of medical sciences, Department of Reconstructive Surgery of the Middle Ear at the Clinic of Otorhinolaryngology (director: Prof N. A. Preobrazhenskiy, Lenin Prize laureate), First Moscow Medical Institute imeni I. M. Sechenov

[Abstract] A survey was made of a variety of biological glues used in surgery of the ear, and Soviet brands, MK-2 and MK-7 (methyl-2-cyanacrylate) were tested for reconstructive surgery. Various surgical procedures are described in detail, emphasis being laid on the possibility of immobilizing ossicles with biological glue, as well use thereof to close tympanic perforations. Combinations of materials (including teflon) may be necessary for some forms of prostheses, and the tested biological glue immobilizes them well. MK-7 was well-rated for its rapid polymerization, sterility, lack of toxicity, complete absorption within 6 months and replacement by connective tissue. Figures 3; references 11: 4 Russian, 7 Western.  
[221-10,657]

## STUDY OF THE NATURE OF PARAMAGNETIC CENTERS APPEARING IN GAMMA-IRRADIATED LL TUMOR CELL CULTURES

Moscow BIOFIZIKA in Russian Vol 25, No 1, Jan/Feb 80 pp 106-109 manuscript received 18 Oct 78

AVDEYEVA, O. S., GOTLIB, V. Ya., RIKHIREVA, G. T., and PULATOVA, M. K., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] The low temperature EPR spectra of irradiated tumor cell cultures were presented. The tumor cell culture was selected for this experiment, because the study on whole tumors or organs would have been complicated by their heterogenic composition and state. LL cells in the logarithmic growth stage were used. Prior to irradiation of the LL cells, only an insignificant EPR absorption in the free radical range was noted. The EPR spectrum of  $\gamma$ -irradiated cells represented cumulative superimposition of signals from several paramagnetic centers (PC) formed in the process of irradiation. The ionizing radiation damaged the DNA molecule by forming

H-adducts of pyrimidine bases. The formation of these H-adducts goes by the way of their anion-radical state; therefore one must stress the importance of the electron capture reaction during the radiation damage to the cell. Figure 1; references 5: Russian.  
[266-7813]

UDC 612.824:612.173.3

NONINVASIVE DETERMINATION OF CEREBRAL BLOOD FLOW AND ITS RELATIONSHIP TO THE MINUTE VOLUME

Moscow KARDIOLOGIYA in Russian No 1, 1980 pp 54-57

PALEYEV, N. R., KAYEVITSER, I. M., and AGAFONOV, B. V., Moscow Oblast Scientific Research Clinical Institute imeni M. F. Vladimirskiy

[Abstract] A noninvasive technique was devised for the determination of cerebral blood flow which is based on the relationship between the latter and the minute volume of the heart as determined from rheoencephalography and transthoracic rheography, respectively. Application of the technique to 20 clinically healthy 40-60 year old subjects yielded a cerebral flow rate of ca. 708.0 ml/min, which is in excellent agreement with results obtained by other methods. Studies on 20 patients with various forms of hypertension provided mean values ranging from ca. 473 to 545.8 ml/min, while the spread in the case of a 20 patient group with cerebral atherosclerosis was 391 to 472 ml/min. These observations suggest that the combination of rheoencephalography and transthoracic rheography may provide a convenient noninvasive approach for evaluation cerebrovascular circulation. Tables 2; figures 1; references 16: 2 Western, 14 Russian.  
[251-12172]

## DYNAMICS OF THE CIRCADIAN RHYTHMS AND OF THE REACTIVITY OF MICROVESSELS IN CARDIOVASCULAR SYSTEM DISEASES

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 1, 1980 pp 39-43 manuscript received 2 Jan 79

GEKHT, B. M., ALEKSANDROV, P. N., VINOGRADOVA, L. I. and SHAGAL, D. I.,  
Institute of General Pathology and Pathological Physiology, USSR Academy of Medical Sciences, Moscow

[Abstract] It is pointed out that earlier studies of the influence of helio-geophysical factors on the condition of the cardiovascular system relied largely on statistical analysis of recorded data and that these studies did not permit a clinical and pathophysiological approach to the mechanisms of reactions to those factors. The present work involves study on healthy individuals, patients with vegetative vascular dysfunctions and patients with acute and chronic ischemic heart disease. Results were compared on the dynamics of circadian rhythms, condition of the microvessels of the bulbar conjunctiva, their reactivity to adrenaline application and, also, the dependency of these states on a change in the heliogeomagnetic situation. The reactivity of patients to change in the geophysical factors accompanying the passage of the earth from one sector of the interplanetary magnetic pole into another was assayed by the "superimposed epo" [sic] method of M. N. Gnevyshev (1971); assisting in the latter were personnel of the Laboratory of Polar Geophysical Research of the Institute of Terrestrial Magnetism and Radiowaves, USSR Academy of Sciences. Findings indicated that the vegetative disturbances (40% of the cases) and attacks of stenocardia (37%) occurred mainly during the day when the earth crosses the boundaries of the sectors of the interplanetary magnetic fields. The frequency of incidence of myocardial infarction (36%) was highest during the next day. Changes in biological rhythms, microvessel reactivity and hemodynamics appear to precede development of vascular crises. Figures 2; references 18: 13 Russian (one a reference to a Japanese author), 5 Western (one by Soviet authors S. M. Mansurov, et al.).

[212-8586]

## PROPHYLAXIS AND TREATMENT OF SEA SICKNESS

Moscow MORSKOY SBORNIK in Russian No 6, June 1979 pp 40-42

YEFREMENKO, M., major of medical services

[Abstract] The concealed and open forms of sea sickness are discussed in terms of symptoms ranging from minor discomfort and heaviness in the head to nausea, nervousness, paleness of skin and cold sweat, and pulse disturbances. Measures for prevention include regimens of exercise, fresh air and proper diet, fresh air in crew quarters combined with cool temperatures, and finally when these fail, medications including anestezine, novocaine, dramamine and others, aimed at suppressing and controlling sleeplessness and other undesirable reactions. The importance of distractions from the pitching is stressed. Figure.

[359-12131]

UDC 616.153.922-037

## THE POSSIBILITIES OF PREDICTING HYPERCHOLESTEROLEMIA IN PILOTS

Kazan' KAZANSKIY MEDITSINSKIY ZHURNAL in Russian Vol 60, No 3 (May/Jun), 1979 pp 18-20 manuscript received 20 Oct 78

VAVILOV, M. P., candidate of medical sciences, The Central Lenin Laureate Institute for Advanced Training of Physicians, Moscow

[Abstract] The history of illnesses of 300 pilots who had undergone complete medical and clinical examination to determine their suitability for flying, including ECG, orthostatic tests, and hypoxia tests, as well as cholesterol levels, was studied. Of the total 19% were declared healthy and 12% practically healthy, while 24% were regarded as having hypertonic illnesses at early stages, 13% had central nervous system disorders, 9% had gastrointestinal ailments. Of the total 10% were declared unfit and 17%, partially fit for flying duty; the rest were approved. Results confirmed the general tendency toward a maximum of cholesterol at about the age of 45. Data processed indicated a pattern of hypercholesterolemia that permits predictions of the disease in pilots. The size of the sample is cited as a limitation on the application of the predictive procedure. Figures 3.

[351-12131]



## BASIC RESEARCH IN MEDICINE

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 2, 1980 pp 37-45

CHAZOV, Ye. I., academician, member of USSR Academy of Medical Sciences Presidium

[Abstract] A discussion of research being conducted by associates of the laboratory of myocardium metabolism of the USSR Academy of Medical Sciences All-Union Cardiological Center and in collaboration with other institutes included descriptions of the basic role of creatinephosphokinase systems in energy transport from mitochondriae to places of its use; studies of contraction and relaxation of the heart and their relationship to cardiac insufficiency; the role of intracardiac and intracellular hormonal regulation during heavy cardiac loading in rabbits; the role of general pathological processes in the cause and rise of atherosclerosis and the role of cholesterol and lipoproteins quality in these processes; possibility of the use of immobilized enzymes and development of biocompatible and bioresorptive polymer carriers in therapy and synthesis of enkephalin and experiments in its use. Figures 3.

[255-2791]

UDC 61:347.77.018

## APPROBATION OF DISCOVERIES IN THE MEDICAL AREA

Moscow SOVETSKAYA MEDITSINA in Russian No 11, Nov 79 pp 94-98 manuscript received 29 Sep 78

IONAC, V. M. and MODL', A. A., All-Union Scientific Research Institute of State Patent Expertise, Moscow

[Abstract] This law-oriented article explains at the outset how to identify an invention: according to law, it is a new--with essential differences from something presently existing--technical solution of a task in any field of the national economy, of social-cultural production or of national defense, and which has a positive effect. In the medical field the invention could be a therapeutic substance, a cosmetic agent, a method of prophylaxis, diagnosis or treatment of human disease. The positive effect factor is an essential element: the invention must be more than useful, it must achieve a new higher result than hitherto possible, and this has to be proven, by the

claimant, with tangible evidence, experimental and clinical data. The component government organ of approbation is the USSR Ministry of Health, the republic ministries, the Academy of Medical Sciences, the leading scientific research institutions. New drugs have to be approved by the Pharmacology Committee of the USSR Ministry of Health. New bacterial, rickettsial, viral and seral therapeutic-prophylactic preparations, allergens, nutrient media have to be approved by the Committee of Vaccines and Sera of the Main Sanitary-Epidemiological Directorate, USSR MH; new disinfectants, insect and rat control agents have to be approved by the Commission on Evaluation and Approbation of New Disinfection Materials for Use in Practice, of the Main Sanitary-Epidemiological Directorate, USSR MH. Cosmetics also go to the latter Directorate. Approbation of new technology is in the hands of the Committee on New Medical Agents and Medical Technology, USSR MH. Improvement of an already existing procedure does not require approbation as high as the USSR MH; it can be granted at a so-called "head" organization. Questions involving conflicts can be resolved by these "head" institutes; if hospitals or polyclinics are involved the pertinent head installation is the competent resolver. Various points for decision are discussed. The inventor can go before the competent approving organ to argue his rights, including the factor of a positive effect.

[147-8586]

UDC 614.777.628.314:615.012:66.09

#### CURRENT STATE OF AND PROSPECTS FOR THE PURIFICATION OF WASTE WATERS FROM PHARMACEUTICAL PLANTS

Kiev FARMATSEVITYCHNYY ZHURNAL in Ukrainian No 1, 1980 pp 22-26

TYMOFYEYEV, V. V., Kharkov Scientific Research Institute of Pharmaceutical Chemistry

[Abstract] A review is presented of Soviet literature dealing with the problems concerning both the purification of waste waters from pharmaceutical plants and the large quantities of water that such plants utilize in the production of various dosage forms. Emphasis is placed on the primary methods of waste water treatment (mechanical, chemical, physicochemical, biological), the use of high temperature-treatment and incineration in certain cases, and on the need for more efficient processing of the raw materials and their recovery from the effluent. References: 30 Russian.

[282-12172]

MORBIDITY OF MALIGNANT TUMORS AMONG THE RSFSR POPULATION FOR THE 12-YEAR PERIOD 1966-1977

Moscow SOVETSKAYA MEDITSINA in Russian No 11, Nov 79 pp 90-93 manuscript received 9 Mar 78

KOZLOVA, Ye. V. and TROITSKAYA, I. B., Scientific Research Oncology Institute imeni P. A. Gertsen, Moscow

[Abstract] Second place as cause of death in the RSFSR--after cardiovascular disease--is occupied by malignant tumors. This article tabulates i) standardized indices of cancer morbidity for males and females (per 100,000 residents), ii) percentages of incidence by site of tumor for the year 1966 (time of establishment of the diagnosis) and 1977 (same time)--sites, e.g., being stomach (the highest in 1966 and 1977), lungs (highest incidence 25.4%, in 1977, as opposed to 20.8%, in 1966), skin, lip, larynx, esophagus, large colon and oral cavity and iii) incidences in women for 1966 (stomach, 28.2%; uterus, 16.0%; skin 12.3%, and breast 8.6%) and for 1977 (19.9%; 11.6%; 13.3%; and 12.8% respectively). Characteristic incidence is cited for certain locales of the RSFSR and the data which contain such information are to be used to guide cancer control measures.  
[147-8586]

UDC 614.86-082

ANALYSIS OF PRESENT-DAY HIGHWAY ACCIDENT TRAUMATISM AND MEANS OF IMPROVING MEDICAL ASSISTANCE TO THE VICTIMS

Moscow ORTOPEDIYA, TRAVMATOLOGIYA I PROTEZIROVANIYE in Russian No 9, 1979 submitted 30 Oct 78, signed to press 28 Aug 79 pp 18-23

TRUBNIKOV, V. F., ISTOMIN, G. P. and ZAYTSEV, V. T., Chair of Orthopedy, Traumatology and Field Medicine Surgery (Head-Professor V. F. Trubnikov) of the Kharkov Medical Institute and the Kharkov Institute of General and Emergency Surgery (Director Professor V. T. Zaytsev)

[Abstract] A discussion of the increase of highway injuries in relation to the increase of traffic shows the majority of accidents involve pedestrians and vehicular collisions with an increase of accidents in the summer and early autumn and during weekends and during the hours of 4 p.m. to 11 p.m. Injuries are highest among able-bodied men and 1/5 to 1/6 of those involved

are intoxicated. The leading types of injuries are contusions, abrasions, fractures, wounds and ruptures of internal organs while most accidents involved multiple injuries. Training drivers in first aid techniques and transportation of the injured and equipping vehicles with first aid equipment were recommended for reducing the damage at accident sites, and increasing the skill of emergency medical service personnel was recommended to lower mortality rates and severity of effects of trauma. References 14; figures 5. [235-2791]

UDC 618.333+616-053.31-36.88 -02

AN ATTEMPT AT STUDYING THE MULTIPLE CAUSES OF PERINATAL MORTALITY ON THE BASIS OF A SPECIAL "DOCUMENT ABOUT PERINATAL DEATH"

Moscow ARKHIV PATOLOGII in Russian No 1, 1980 pp 72-77 manuscript received 16 Mar 80

IGNAT'YEVA, R. K. and KADREKAYEVA, N. I., The Department of Health Statistics for the Population of the N. A. Semashko All-Union Scientific Research Institute for Social Health and Health Care Organization of the USSR Ministry of Health Care, Moscow

[Abstract] In view of the low birth rate among developed countries, reasons for infant mortality take on new importance and the need for comprehensive data led to the preparation of a perinatal death document listing numerous causes that may have been involved in perinatal death, beyond immediate ones. Data collected on 2465 deaths relate causes to placenta and fetal abnormalities, maternal disorders, and abnormalities in the course of pregnancy and delivery. Specific causes of asphyxia, which caused some two-thirds of deaths, birth defects which caused 10%, and birth trauma which caused about 8%, are presented. Tables 3; references 10 in Russian. [281-12131]

**EARLY REHABILITATION OF PREMATURE CHILDREN BORN TO MOTHERS WITH SEVERE TOXEMIA LATE IN PREGNANCY**

Kazan' KAZANSKIY MEDITSINSKIY ZHURNAL in Russian Vol 6, No 6, Nov/Dec 79  
pp 8-11 manuscript received 23 May 78

BELOVA, N. A., Department of Hospital Pediatrics, Kazan' Medical Institute imeni S. V. Kurashov, and Maternity Hospital No 4, Kazan' Municipal Health Department

[Abstract] Observations were conducted on 66 premature children born to mothers with moderate and severe toxemia late in pregnancy. Rehabilitation therapy was done on 32 of the infants in the neonatal period. The control group was made up of 14 relatively healthy premature children who were not carried to full term for a variety of random causes. The proposed rehabilitation procedure is aimed at normalizing neurodynamic disorders of the central nervous system, improving cardiovascular action, and correcting metabolic and enzymatic disorders. The babies are put into incubators where optimum conditions are maintained until the second stage of convalescence is reached, helium-oxygen inhalation therapy is given for 15-20 minutes 2 or 3 times a day until external respiratory functions are normalized, and special infusion therapy is given, based on the principle of normovolemic hemodilution. The stages of the therapy are described. The proposed treatment reduces perinatal incidence of illness and mortality to one half, and improves long-range health of premature children. Reference 1.  
[149-6610]

**CAUSES OF DISABILITY AMONG WOMEN OF CHILD-BEARING AGE (BASED ON DATA FOR THE CITY OF PERM')**

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 2, 1980 pp 16-18 manuscript received 19 Feb 79

SHISHKO, O. A., Chair of Social Hygiene and Public Health Organization (headed by Prof V. A. Ninyayev), First Leningrad Medical Institute imeni Academician I. P. Pavlov

[Abstract] In 1974 a study was conducted in one of the districts of Perm' of disabled women ranging in age from 15 to 49 years, as compared to data for 1970-1974 pertaining to fertility. Analysis was made of grade (I, II,



III) of disability as related to the age of the women, as well as changes in disability rating at different ages. Causes of disability were discussed, and their influence on employment of such women was demonstrated as related to different occupations. Figures 2.  
[274-10,657]

## ENVIRONMENTAL HAZARDS

UDC 616-001.28-036.11-092:615.849.5

### DEGREE OF SEVERITY OF ACUTE RADIATION DISEASE AS A FUNCTION OF RADIATION DOSE WITH NON-UNIFORM IRRADIATION OF MAN

Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 11, Nov 79 pp 29-31

KLIMOV, I. A., professor, colonel of the medical service

[Abstract] Various Soviet and non-Soviet authors are cited as the foundation for distinguishing five basic variants of the geometry of action of radiation on man: i) uniform gamma radiation, often associated with alpha and beta radiation upon the open surface of the body; ii) general gamma-neutron injury; iii) general radiation with primarily gamma-neutron action upon the upper half of the body; iv) general action of radiation with predominant injuries of a part of the abdomen and extremities; and, v) segmentary radiation of the head, abdomen and other parts of the body. The first variant is more probable if people are in a zone of high radioactivity of nuclear explosion products which are in the air or settle upon the earth's surface; the other variants occur with various accidental situations. Considerable study has been devoted to the uniform type of irradiation. The features of development of acute radiation disease under non-uniform irradiation have not received extensive study; dose differences of isometric effects with the several variants of the geometry of radiation have not been established. In the present study, data on 23 individuals--who had been affected in accidents in non-Soviet research laboratories--are analyzed as examples of the non-uniform radiation type. In one group, 16 had been exposed to 69-1500 rad mainly on the head and upper body; in another, 7 had been exposed to predominant action of gamma and gamma-neutron radiation on the abdomen and extremities. The locations of the laboratories where the injuries occurred are not identified; cited WHO literature probably could help to identify the locations and clinical features of the injuries. Mathematical processing, in this article, of the data indicate that dose differences in the isometric effects can support an estimation of assumed sanitary losses and a prediction of the severity of an injury following a variant of the geometry of human irradiation. References: 19 Russian.  
[145-8586]

QUANTITATIVE CRITERIA FOR THE EVALUATION OF RADIATION DAMAGE TO NORMAL  
TISSUE CELLS

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian No 12, 1979 pp 7-10 manuscript  
received 30 May 79

KONOPLYANNIKOV, A. G., Scientific Research Institute of Medical Radiology,  
USSR Academy of Medical Sciences, Obninsk

[Abstract] Quantitative criteria for the evaluation of radiation damage of various tissues have become available only within the last 10-15 years. These were first developed for the determination of radiation damage to animal hematogenic trunk cells. A review of the pertinent literature was reported. The task ahead is to expand the methodology to include the human system. Two methods capable of determining radiation damage to the intestinal epithelium exist, but neither can be used in human tissue. Another system of interest includes spermatogenic epithelium, whose cells, although not critical to the survival of an organism, provide the only system with morphologically characterized trunk cells. Recent studies concentrate on less rapidly regenerating cells from the endothelium vessels of the lungs and spinal cord. For the slow regenerating systems, the effects of radiation damage are first realized through sterilization of vascular endothelium cells, followed by the death of parenchymal cells. References 11: 2 Russian, 9 Western.  
[201-7813]

UDC 617-001.28

EVALUATING THE EFFECTS OF EXTERNAL BETA-IRRADIATION OF THE ORGANISM UNDER  
THERMAL LOADING CONDITIONS

[Unknown] ZHURNAL EKSPERIMENTAL'NOY I KLINICHESKOY MEDITSINY in Russian Vol 19, No 1, 1979 pp 12-16 manuscript received 26 Oct 77

MATYUSHICHEV, V. B., TARATUKHIN, V. R., and SHAMRATOVA, V. G., Leningrad  
State University

[Abstract] The effects of beta-irradiation and combination thermal loads were evaluated directly on 204 common white male rats weighing 160-180 grams, with 60 intact animals serving as the control. The ATA activity of brain and liver tissues was studied as the test criterion. Irradiation in a dose of 4.45 krads causes the most significant post-radiation changes of liver ATA. The enzyme activity changes by 112 percent compared to the intact control. Lower and higher doses have a lesser effect and cause fewer changes

of enzyme activity. Irradiation of 2.5 krad causes maximum deviations of brain activity, while an increase of dosage results in weakening of the effect. Thermal loading is reflected differently in the course of enzyme processes in the liver and brain, causing intensification of the effect of irradiation in the liver and attenuation of it in the brain. There is an inverse dependence of the intensity of the distorting effect of thermal loading on the effectiveness of the radiation itself. External beta-radiation by itself and in combination with thermal loading causes stable and clearly marked changes of the enzyme activity of the tissues. References: 4 Russian. [0347]

UDC 613.633+613.648]-092.9

LONGTERM CONSEQUENCES OF THE COMBINED EFFECT OF THE RADIATION-DUST FACTOR AND CHRONIC GAMMA-IRRADIATION ON THE RAT

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 12, 1979 pp 34-36

PONOMAREVA, V. L., BURYKINA, L. N., VASIL'YEVA, L. A., AYZINA, N. L., BESELOVSKAYA, K. A., LIKHACHEV, Yu. P., MAL'TSEVA, M. M., KAPITANOV, Yu. T. and SATARINA, S. Ya., Moscow, Institute of Hygiene of Labor and Occupational Diseases, USSR Academy of Medical Sciences

[Abstract] Comprehensive hygienic assessment of the environmental factors in industry is becoming increasingly important in view of the potentiating effect of combinations of these factors on the organism. This applies, e.g., to the enterprises processing polymetal ores that contain radioactive elements. In this connection the pathological effects of the intrapulmonary penetration of yttrium-containing parasite dust in a combination with chronic gamma-irradiation was investigated on 300 white rats. The overall gamma-radiation dose chronically administered for 6 months was 250 rad. Concentrate dust containing 0.2-0.7 natural thorium and 0.01% uranium, was administered intratracheally. The rats were under observation for 22 months. The half concentrate-elimination periods of the dust from lungs of the rats amounted to 4 1/2 days for 63% of the dust, 36 days for 11%, and 173 days for 26%. The longterm consequences of dust intake (absorbed dose in the lungs 0.3+0.17 rad) included the development of moderate fibrosis and benign tumors of the lungs (adenomatoses, adenoma). The dust was found to produce a potentiating effect when combined with internal alpha-irradiation by  $^{232}\text{Th}$  (equivalent lung dose 25-70 rad) in terms of blastomogenic effects. When the administration of the dust was combined with chronic external gamma-irradiation, an additive effect on the yield of pulmonary tumors was observed. References: 4 Russian. [215-1386]

## EFFECT OF THE INHIBITOR OF REPLICATIVE DNA-POLYMERASE ON THE RADIORESISTANCE OF MICE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 250, No 5, 1980 pp 1259-1261 manuscript received 19 Sep 79

BELOVSKAYA, L. N., FILIPPOVICH, I. V., ZNAMENSKIY, V. V., TEREKHOV, A. V., ZHEREBCHENKO, P. G., ROMANTSEV, Ye. F., YASHUNSKIY, V. G. and LEONOVA, T. S., Moscow Institute of Biophysics

[Abstract] It is known that the radioprotective effect of inhibitors of DNA replication is at least partially due to its temporary nature and hence also to greater completeness of reparative processes following radiation damage. In this connection, the effectiveness of nalidixic acid was investigated on hybrid mice F<sub>1</sub> (CBA x C57Bl), upon first establishing that LD<sub>50</sub> = 380 mg/kg. The radioprotective effect was investigated by administering nalidixic acid in an aqueous solution in the form of sodium salt prior to the gamma-irradiation of the mice. The survival rate of the mice within 30 days following the irradiation was then recorded. When administered 1 hr prior to the irradiation, the acid preparation was found to produce a moderate radioprotective effect that was roughly uniform regardless of the dose administered (within the range of from 70 to 220 mg/kg). The survival rate was 40%. When administered 15 hr prior to the irradiation, the acid resulted in a 22% survival rate. This indicates that nalidixic acid is superior in duration of effect to most other known radioprotectors. The antiradiation activity of nalidixic acid is due to its selective inhibition of DNA-polymerase of the replicative type, although other mechanisms, associated with primary inhibition of DNA synthesis, also may be involved. These findings open new prospects for the identification of radioprotectors among various classes of chemical compounds. References 13: 5 Russian, 8 Western. [244-1386]



DYNAMICS OF THE NUCLEIC ACID CONTENT RESULTING FROM ADMINISTRATION OF  
SELENOSEMICARBAZIDE TO INTACT AND IRRADIATED ANIMALS

Baku IZVESTIYA AKADEMII NAUK AZERBAYDZHANSKOY SSR in Russian No 3, 1979  
pp 83-86

KULIYEV, T. A., MEKHTIYEV, M. A., BABAYEV, R. A., KULIYEV, K. A. and  
SAMEDOV, Z. R.

[Abstract] The DNA and RNA content in isolated liver cells of irradiated and intact Wistar rats was determined by the cytophotometric method after administration of selenosemicarbazide (SSC), in an attempt to evaluate its radiation protective ability. A triple gavage of SSC resulted in a marked change of the DNA and RNA content in the isolated liver cells. The desired effect was obtained in irradiated animals after a single dose of SSC 40 min prior to irradiation. The shifts were more pronounced with the RNA than DNA. Without SSC a drastic decrease of nucleic acid content was noted after irradiation with 600 rads. References 8: 1 Russian, 7 Western.  
[111-7813]

PREDICTION OF TOXICITY AND ESTIMATION OF HYGIENIC STANDARDS (MAXIMUM PERMISSIBLE CONCENTRATIONS) OF CADMIUM PRODUCTS ON THE BASIS OF THEIR ELECTRON-CONFIGURATION STRUCTURE

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 2, 1980  
pp 42-45 manuscript received 17 Mar 78

SHCHERBAKOV, G. G., Stavropol' Medical Institute

[Abstract] This study was conducted on a group of cadmium-zinc luminophores with the arbitrary formula  $CdS-ZnS:A$  (where A is the activator) and involved determination of the following: electron structure as a function of toxicity of metals in the zinc group and chalcogenides; physicochemical properties as a function of toxicity of chalcogenides and metals in the Zn group; donor-acceptor correlations between constituents of complex materials; toxicity of Cd in substances differing in structure; comparative LD<sub>50</sub> and maximum permissible concentrations of cadmium-zinc products. Figures 5; references 11: 9 Russian, 2 Western.  
[272-10,657]

## BASIS FOR REVIEW OF MPC OF HYDROGEN FLUORIDE AND INORGANIC SALTS OF HYDROFLUORIC ACID FOR THE AIR OF A WORK ZONE

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 1, Jan 80 pp 15-18 manuscript received 14 Jan 79

DAVYDOVA, V. I., SHCHERBAKOV, S. V., PLOTKO, E. G., SHARIPOVA, N. P., YUSHKOV, N. N. and STARKOV, P. S., Institute of Labor Hygiene and Occupational Diseases, Sverdlovsk

[Abstract] Figures on occupational fluorosis incidence in workers of the aluminum and superphosphate industries indicate that current MPCs for fluorine compounds do not assure prophylaxis of chronic fluorine intoxication and must be revised downward. The existing Soviet MPC for hydrofluoric acid salts is  $1 \text{ mg/m}^3$  and for HF is  $0.5 \text{ mg/m}^3$ . This article examines toxicity of readily-soluble ( $\text{NaF}$ ) and difficulty-soluble (cryolite) salts in water. It was established at the onset that the fluorides salts contaminating the working zones of the shops are 40-50% readily water soluble; measuring only this portion of the contamination would be inadequate. Inhalation studies were run on white rats. Results indicated that the MPCs were too high, as expected, and that separate MPCs have to be set for the readily and difficult soluble salts. The MPCs (based on fluoride ion) suggested are  $0.05 \text{ mg/m}^3$  for HF;  $0.2 \text{ mg/m}^3$  for readily soluble fluoride salts; and  $0.5 \text{ mg/m}^3$  for difficulty soluble fluoride salts. References 5: 4 Russian, 1 Western.

[217-8586]

## HYGIENIC SIGNIFICANCE OF THE ENERGY, TIME AND INFORMATION ASPECTS OF INTERMITTENT NOISE

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 1, Jan 80 pp 5-8 manuscript received 17 Feb 79

SUVOROV, G. A., DENISOV, E. I. (Moscow) and KOLGANOV, A. V. (Donetsk), Institute of Labor Hygiene and Occupational Diseases, USSR Academy of Medical Sciences; Institute of Labor Hygiene and Occupational Diseases

[Abstract] Hygienic evaluation of intermittent sounds--which occur widely in industry--is carried out according to the Soviet state standard GOST 12.1.003-76, "SSBT. Sound. General Requirements of Safety," and is based on an equivalent level corresponding to the ISO (1971) recommendation. It

is pointed out that bodily changes are a function, not only of the equivalent level, but, also, of the form, sequential frequency, time of increment of the advancing front of pulses and of other qualities which must be taken into consideration when setting up standards for noise. The present article discusses a study of 351 workers subjected to intermittent noise; measurements were made of hearing loss (tonal threshold of audiometry), arterial pressure and pulse rate. The noise involved pulses and intervals, high frequency components, levels exceeding permissible levels by 19-24 dB A. The biological activity of the intermittent noise was due to the sound dose and the time aspects which aggravate its unfavorable action. The form, duration and sequential frequency affect the functional status of the auditory analyzer, the most important being the time of increment of the advancing front of pulses. The magnitude of adjustment to an equivalent level of intermittent noise from 5 to 15 dB A, was determined as a function of the increment time and the duration of pulses. The effect of the informational aspects (sound of an industrial process and its perception) of intermittent noise on biological activity might be assayed by a suggested formula to calculate its entropy. Figures 2; references 9: 7 Russian, 2 Western.  
[217-8586]

UDC 613.644

#### PHYSICAL BASIS AND CALCULATION OF NOISE DOSAGE

Moscow GIGIYENA TRUDA in Russian No 11, 1979 pp 24-28

DENISOV, E. I., Institute of Hygiene and Occupational Diseases, USSR Academy of Medical Sciences, Moscow

[Abstract] A mathematical analysis is presented of the physical factors contributing to noise dosimetry, proceeding from an integral equation for calculating equivalent noise levels in intermittent situations with variable noise intensities. On the basis of the mathematical consideration, tables were derived for determining threshold limit values for noise, and for the extent to which they are exceeded under different conditions of exposure and intensity. Such an approach to a qualitative/quantitative evaluation of noise effect offers an additional advantage in that dose-effect criteria can be established for occupational exposure to noise. Tables 3; references 7: 4 Russian, 3 Western.  
[188-12172]

## EFFECTS OF INTERMITTENT HIGH INTENSITY NOISE ON BLOOD LIPIDS AND NEUROGENIC ATHEROSCLEROSIS IN THE RABBIT

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTAL'NAYA TERAPIYA in Russian No 1, 1980 pp 45-48

RODIONOVA, L. P. and SHELEST, G. A., Central Scientific Research Laboratory, Chair of Pathophysiology, Chair of Labor Hygiene, Leningrad Sanitary-Hygienic Medical Institute

[Abstract] Investigations were conducted on neurogenic atherosclerosis in rabbits through exposure of the animals to high intensity intermittent noise for various periods of time (several days to seven months; 80-100 dB pulses at 0.3 pulses/min, 3 h per day). Determinations of blood levels of UFA, 11-OHCS, cholesterol, triglycerides, phospholipids, and beta-lipoproteins revealed a biochemical profile which indicated that chronic exposure to high intensity noise leads to hyperlipemia and initial activation and subsequent exhaustion of the hypothalamo-hypophyseal-adrenal system. The resultant fall in blood levels of 11-OHCS predisposes to changes in endothelial permeability which, in conjunction with hyperlipemia, result in the formation of atheromatous plaques. Approximately 50% of the experimental animals developed atherosclerotic lesions in the aorta. Tables 1; figures 1; references 13: 9 Russian, 4 Western.  
[278-12172]

## FORMATION OF INTENSIVE MOSQUITO BREEDING SITE IN THE ARNASAY LOWLAND OF UZBEK SSR. REPORT 2: SEASONAL POPULATION DENSITY AND SOME PROBLEMS OF BIOLOGY AND ECOLOGY OF ADULT ANOPHELES PULCHERRIMUS MOSQUITOES

Moscow MEDITSINSKAYA PARAZITOLOGIYA in Russian No 1, 1980 pp 3-9 manuscript received 20 Mar 79

TADZHIYEVA, V. S., ZAYNIYEV, S. A., MUMINOV, M. S., KHADAROVA, Z. M., ATARSKAYA, V. V., and GALINA, Z. A., Uzbek Scientific Research Institute of Medical Parasitology imeni L. M. Isayev, Samarkand

[Abstract] The fauna and aggressiveness of mosquitoes in the Arnasay Lowland were studied because of the recent intensive breeding thereof, prevalence of malaria mosquitoes, intensive attacks on man and animals. These studies were pursued in 1973-1976 at the Kizilkum and Chirkurgan sovkhoses

in Dzhizakskaya Oblast, Uzbek SSR; the species found are listed, factors determining mosquito population density and activity are discussed. Figures 3; references 8: 7 Russian, 1 Western.  
[276-10,657]

UDC 576.895.771.095.18:615.285.7.025.1:547.562.332

ANNUAL AND SEASONAL CHANGES IN SENSITIVITY TO DDT OF ANOPHELES SACHAROV  
(FAVRE), THE MAIN VECTOR OF MALARIA IN AZERBAIJAN SSR

Moscow MEDITSINSKAYA PARAZITOLOGIYA in Russian No 1, 1980 pp 12-15 manuscript received 8 Jun 79

RECHKALOVA, N. I., Central Institute for Advanced Training of Physicians, Moscow

[Abstract] In order to assess the effectiveness of various chemical agents in the control of malaria carriers it was important to study the trends of changes in sensitivity to DDT, which vary in different populations of *An. sacharovi* from different areas. Annual changes in DDT sensitivity were determined in Sabirabadskiy, Akhsuinskiy and Masallinskiy rayons, and seasonal changes were studied in Bardinskiy, Akhsuinskiy and Masallinskiy rayons (Azerbaijan SSR), in 1972-1978. The findings are summarized in tables, and they indicate that resistance to DDT usually increases and persists even when DDT is no longer used. The seasonal changes in sensitivity suggest that this factor be taken into consideration when scheduling insecticide treatment. Figures 4; references 5: 4 Russian, 1 Western.  
[276-10,657]



ELECTROPHYSIOLOGICAL AND MORPHOLOGICAL STUDY OF THE NEOCORTICAL AND DEEP  
BRAIN STRUCTURES DURING TRANSCRANIAL MICROPOLARIZATION

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian Vol 65, No 10, Oct 79  
pp 1448-1457 manuscript received 7 Apr 78

GAL'DINOV, G. V., AKIMOVA, I. M., SHKLYARUK, S. P. and NOVIKOVA, T. A.,  
Laboratory of Physiological Mechanisms of Memory Control, Institute of  
Experimental Medicine, USSR Academy of Medical Sciences, Leningrad

[Abstract] Although transcranial polarization has been used (Bobkova, 1956; Lippold, et al, 1964) to treat certain nervous and mental diseases, the neurophysiological mechanism of the therapeutic effect is obscure. Several authors (Bekhtereva, 1977; Vartanyan, 1965; and Ilyukhina, 1975) have reported some success from use of intracerebral micropolarization to treat brain pathologies; the positive results involved restructuring of functional organization of the brain and changes in its bioelectric activity, modulating memory processes. To gain some insight into the therapeutic basis of transcranial polarization, the present article has examined the effects of transcranial micropolarization (TMP) upon the structural-functional status of the cerebral cortex and analyzed the corticofugal effects due to the transcranial micropolarization.

Acute and chronic experiments were run on cats, rhesus monkeys. TMP was produced by positioning 1.5 mm stainless steel electrodes on the skull at the sensomotor, visual, acoustic and posterotemporal areas using 0.1-3 mA current, for 30-60 min. Anode, cathode, and bipolar polarization were also employed. It was shown that TMP, like that of intracerebral micropolarization, evokes structural-functional rearrangement in the neocortex at electrode sites. Characteristics of descending effects upon the limbic and reticular structures were elucidated. The TMP procedure was able to suppress or to activate corazol convulsions. Figures 5; references 20: 15 Russian, 5 Western.  
[186-8586]

## ACTIVITY OF RAT BRAIN NUCLEASES WITH EMOTIONALLY DIFFERENTIATED REINFORCEMENT

Leningrad FIZIOLOGICHESKIY ZHURNAL in Russian No 4, 1979 pp 507-512 manuscript received 10 Feb 78

SELIVRA, A. I., Laboratory of Applied Physiology and Laboratory of Emotional Memory, Institute of Biophysics, USSR Academy of Sciences, Pushchino

[Abstract] The changes in enzyme activity of nucleic exchange in various parts of the brain were examined after training of rats with emotionally positive (receiving food) and negative (electric shock) reinforcement. Results of examining brain nuclease activity in various stages of learning development (with food reinforcement) indicated a common tendency of alkaline and acid enzymes to increase activity in all investigated parts: neocortex, hippocampus, midbrain, and caudal portion of the brain stem. For alkaline enzymes, this was most evident in the caudal portion of the brain stem. Activity of acid enzymes was less evident, but also most significant in the caudal portion of the brain stem. With negative reinforcement, an increase of activity of both forms of enzymes occurred in all examined brain parts, surpassing the reaction to positive reinforcement. This was especially evident with alkaline nucleases. Maximal increase in nuclease activity was observed on the fifth day of learning with positive reinforcement, whereas with the electric shock, maximal changes occurred on the first-second days of learning. As a substrate for enzyme action, researchers used native and denatured DNA. Tables 2; diagrams 2; references 22: 12 Russian, 10 Western. [203-12152]

## ACTION OF PARENTERALLY INTRODUCED AMINO ACIDS AND PROTEIN HYDROLYSATE ON ELECTRICAL ACTIVITY OF BRAIN STRUCTURES

Leningrad FIZIOLOGICHESKIY ZHURNAL in Russian No 4, 1979 pp 500-506 manuscript received 8 Jun 78

VASILEVSKAYA, L. S., ZHURAVLEV, B. V., SUDAKOV, K. V., and SHLYGIN, G. K., Scientific Research Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Laboratory of Physiology and Pathology of Digestion, Institute of Nutrition, USSR Academy of Medical Sciences

[Abstract] The activity of brain structures resulting from parenterally introduced amino acids (glycine, glutamic acid) and protein hydrolysate (mixture of free amino acids and low-molecular peptides) and stimulation of secretion in the stomach were examined. Experiments were conducted on five dogs which had been operated on in two stages: first, a fistula was formed in the stomach; later, electrodes were placed in the brain. With parenteral introduction of the nutrients, the appearance of high frequency, high voltage (12-30 hertz, 50-100 microvolts) electrical waves were recorded in the reticular formation of the brain stem, and in a number of instances, in the lateral hypothalamic nucleus and cortex. Feeding of meat resulted in still greater electrical activity. Parenteral feeding of glucose (5% solution) or salt solution did not result in this type of reaction, nor did sham feeding. The results indicate that these electrical reactions are connected with amino acid reactions affecting the brain. There is no indication that the indicated brain structures are responsible for triggering stomach secretion. Apparently the secretion results from amino acid influences on some receptor formations or direct action on nerve centers of another level. Diagrams 4; references 14: 12 Russian, 2 Western.  
[203-12,152]

# CHANGES IN BRAIN STRUCTURE POTENTIALS UNDER THE INFLUENCE OF MICROPOLARIZATION MODULATING TRACE PHENOMENA

Leningrad FIZIOLOGICHESKIY ZHURNAL in Russian Vol 65, No 3, Mar 79 pp 344-351 manuscript received 20 Jan 78

GAL'DINOV, G. V. and KUDRYAVTSEVA, N. N., Laboratory of Physiological Mechanisms of Memory Control, Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad

[Abstract] The effect of intracerebral micropolarization on the millivolt (mV) potential of brain structures was studied on two monkeys and 6 cats, with implanted electrodes in the motor and temporal zones of the cortex. Gold electrodes gave slightly better results than stainless steel ones. A single micropolarization led to long lasting shifts of the mV potential in the polarized and even in the distal brain structures. Anode micropolarization shifted the mV potential towards the positive side. With repeated micropolarization, initial fluctuations of the mV potential, occurs with respect to the background. This stabilizes after a while. Focal and distal shifts of the mV potential correlate with the changes in multineuronic impulse activity and excitement in the same brain structures. This is related to the regulatory value of mV potential reflecting changes in the metabolic level. The distal changes in the mV potential reflect a general "tuning" of cerebral systems. Figures 5; references 19: 18 Russian, 1 Western. [205-7813]

# THE USE OF MULTILATERAL SPECTRUM ANALYSIS IN THE EVALUATION OF EEG CHANGES

Leningrad FIZIOLOGICHESKIY ZHURNAL in Russian Vol 65, No 5, May 79 pp 772-774 manuscript received 7 Apr 78

CHIRNOSOV, Ye. V. and GORGADY, Yu. I., Military Medical Academy, Leningrad

[Abstract] The multilateral analysis of the EEG spectrum, treating it as a system of interrelated wave components, makes it possible to estimate the reliability of the differences between two EEG signal groups with respect to all the frequency components, as well as to determine individual inputs into the overall estimate of subdivisions, selecting those which are most important to the process of spectrum splitting. This method was used to

study EEG changes in the reticular formation in the midbrain of adult cats, stemming from the administration of galantamine. The dose of galantamine was sufficiently high to cause behavioral changes without leading to vegetative-somatic disturbances. For each selected EEG signal group a spectrum of frequency components was construed in the range from 1 to 31 vibrations per second. Two groups of points were thus obtained, corresponding to the EEG spectra prior to and post the injection of galantamine, and were then analyzed by means of a discrimination analysis. It was shown that galantamine led to a significant change in bioelectric activity in the reticular formation of cats' midbrain. The most significant contribution came from the frequency components in the 23-25 vibrations per second range. Figure 1; references 8: 5 Russian, 3 Western.  
[204-7813]

UDC 612.825.5+612.84

#### SEGMENTAL FOURIER ANALYSIS OF IMAGES AND THE ROLE OF THE OCCIPITAL, TEMPORAL AND PARIETAL CORTEX IN VISUAL PERCEPTION

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian Vol 64, No 12, Dec 78  
pp 1719-1730 manuscript received 17 Mar 78

GLEZER, V. D., Laboratory of the Physiology of Vision, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad

[Abstract] The data employed in this report had already been collected from psychophysiological research and conditioned reflex experiments involving differentiation of visual images; the latter experiments had been carried out by employing extirpation of various sectors of the brain. The data (and some new experimental findings) have been used in this report to construct a neuronal scheme of the organization of visual perception in the large hemispheres of the brain. The article links earlier formed concepts (that depiction of an image in the higher sectors of the visual system is produced by different channels, one of which serves for invariant depiction of form, the others, for depiction of the spacial characteristics of the image) with the observation of Glezer (in 1973) that the occipital cortex accomplishes a piece-by-piece Fourier-depiction of the image. Concepts advanced include i) the idea of a cylinder of cortical neurons whose receptive fields are directed to one site of the visual field and respond to various spacial frequencies and orientation; ii) a system of overlapping modules which accomplish the piece-by-piece Fourier-depiction of the image; iii) Clare-Bishop modules which have receptive fields of different size, and serve to depict the texture of the image; iv) the lower temporal cortex with



a system of learning neurons accomplishes a rough recognition of images and sub-images; v) the parietal cortex, with its spacial operators adjusts the depiction, by the lower temporal cortex, so that it corresponds to the depiction by the occipital cortex; hence the image becomes an actual picture. Figures 4; references 30: 6 Russian, 24 Western.  
[202-8586]

UDC 612.85

#### NONSPECIFIC REACTION OF ACTIVATION UNDER THE INFLUENCE OF UNANTICIPATED AND VOLUNTARILY CONTROLLED SOUND STIMULI

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian Vol 64, No 12, Dec 78  
pp 1756-1763 manuscript received 13 Mar 78

KRYLOV, I. N., Laboratory of Physiology of Higher Nervous Activity, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad

[Abstract] Earphones (of TM-54 telephones) were placed on the ears of 28 healthy subjects; they were exposed to signals from a G3-4A sound generator, 500-700 Hz tone, 20 mcs, 40-80 dB above audibility threshold. The signals were presented either arbitrarily or at a convenient time selected by the subject and sounded by him. A random trial was run. Reaction, or startle, was shown by blink reflex, augmentation of H-reflex, EEG vertex potential and skin-galvanic-reflex (SGR). When the stimuli were voluntarily controlled the components (with the exception of the SGR) of this reaction were less pronounced or absent. This reaction modification was attributed to mechanisms of selective sensory attention, determined by corticofugal inhibition of the reticular interneurons which mediate the reaction. Figures 4; references 24: 7 Russian (one a Western source), 17 Western.  
[202-8586]

## EFFECT OF "SELECTIVE ADAPTATION" IN PERCEPTION OF ELEMENTARY NON-VERBAL STIMULI

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian Vol 64, No 12, Dec 78  
pp 1803-1807 manuscript received 1 Jun 78

OGORODNIKOVA, Ye. A., Laboratory of Biophysics of Speech, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad

[Abstract] This study inquired into the possibility of achieving a "selective adaptation" in the perception of non-speech stimuli. The stimuli used were two combined tones, each of different frequency,  $F_1 = 500$ ,  $F_2 = 2500$  Hz. Gain in intensity of a stimulus was achieved by stepwise increase in intensity of only one of the tones. The rise in gain was constant, 10 dB. The ability to identify the stimuli was tested with a variable interval between start of the stimulus and the moment of gain of intensity of the one tone in the combined tones. Subjects (7) presented with the tone stimulus, which was perceived to be uneven, became tired; the adaptation effect did not appear. However, when the same test was run--with speech stimuli--on the same subjects, all of the subjects showed the effect of selective adaptation. Figures 2; references 7: 3 Russian, 4 Western.  
[202-8586]

## MECHANISMS OF ADAPTIVE CONTROL OF COMPLEX MOTOR SYSTEMS (CONTROL OF DIRECTION AND ACCELERATION)

Moscow AKADEMII NAUK SSSR SERIYA BIOFIZIKA in Russian Vol 24, No 4, Apr 77  
pp 732-740 manuscript received 26 Feb 77

PENEV, G. D., and TAIROV, O. P., The Laboratory of Sensory Motor Systems of the A. A. Zhdanov Leningrad State University

[Abstract] Three aspects of motor control systems, the accomplishment of a particular value of the regulated parameter, maintenance of that parameter, and tracking of changes in that parameter, are discussed in terms of a mathematical model of adaptive control in situations utilizing absolute or accelerated movement values. Algorithms for position control show that where coefficients change quickly it is impossible to identify the state of the system completely, and therefore the class of possible control mechanisms is narrowed. The algorithm for change of position is based on a simple evaluation of a suitable control signal, aimed at achieving some final value

of the parameter. Physiological data indicate that the control system must use visual and other fine control systems to increase precision of movement. The control algorithm for acceleration requires input of adaptive control mechanisms, and finally, complex systems with many variables require a system of non-linear differential equations. Mathematical models for all examples are presented. Figure 1; references 7: 6 Russian, 1 English. [353-12131]

UDC 612.53-06:612.502

SUBSTANTIATION OF OPTIMAL TEMPERATURE OF THE HEAT TRANSFER AGENT SUPPLIED TO THE LIQUID-HEATED CLOTHING USED TO NORMALIZE THE THERMAL STATE OF THE ORGANISM IN A COLD ENVIRONMENT

Moscow FIZIOLOGIYA CHELOVEKA in Russian No 6, 1979 pp 1105-1110 manuscript received 6 Apr 77

KOSHCHYEV, V. S., MAKAROV, V. I. and BAVRO, G. V.

[Abstract] Heat-insulated suits (HIS) based on the use of heated water circulating via tubes (heat exchangers) sewn into overalls made of an elastic fabric are a means of colonizing areas with severe climatic conditions such as Siberia, the Far North, or the Antarctic, or the depths of the ocean. In this connection, the optimal mode of HIS heating was determined by investigating the thermal state of the human organism at rest in a low-temperature environment as a function of the temperature of the heat-transfer agent (water) supplied to HIS. The tests were performed on 8 males 20 to 32 years old in a temperature chamber at  $-25^{\circ}\text{C}$ . The temperature of the water supplied to HIS was varied from 33 to  $47^{\circ}\text{C}$  at  $2-3^{\circ}\text{C}$  intervals. The thermal state of the organism was determined by recording the temperature of the body (rectal) and of the skin (at 14 points). The optimal temperature of the heat-transfer agent under such conditions was found to be  $42 \pm 1^{\circ}\text{C}$ , since any higher temperatures mobilize the organism's heat-release responses and thus increase the heat loss via the areas unprotected against the cold (face, hands). Figures 4; references 12: 8 Russian, 4 Western. [184-1386]

## EFFECTS OF BETA-ADRENORECEPTOR BLOCKADE ON MUSCLE THERMOGENESIS IN COLD-ADAPTED RATS

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian No 1, 1979 pp 61-66

PASTUKHOV, Yu. F., VALOV, R. P., and SAZONOV, V. S., Laboratory of the Physiology of Natural Adaptations, Institute of Biological Problems of the North, Far Eastern Scientific Center, USSR Academy of Sciences, Magadan

[Abstract] The role of beta- and alpha-adrenergic receptors in muscle thermogenesis was investigated on outbred male rats that underwent cold adaptation and treatment with propranolol (10 mg/kg, intraperitoneally) or phentolamine (2 mg/kg). The results showed that administration of the beta-blocker (propranolamine) led to a moderate decrease in body temperature and oxygen consumption, while the electrical activity of muscles increased. The drug-induced activity of m. masseter and m. trapezius exceeded four-fold the increase seen in distal muscles. Stimulation of electrical activity was several fold greater in the deep red fibers than in the more superficial, predominantly white, fibers of m. trapezius and m. tibialis ant. No significant effect was had with administration of phentolamine. The data were interpreted to indicate that enhancement of shivering thermogenesis by propranolol in cold adapted rats was not due to inhibition of nonshivering thermogenesis, but to depressed thermal efficiency of shivering. Tables 2; figures 2; references 19: 15 Russian, 4 Western.

[207-12172]

## TRACE EFFECTS OF SHORT-TERM COLD EXPOSURE AND THEIR SIGNIFICANCE IN ADAPTATION TO COLD

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian No 12, 1977 pp 1715-1720  
manuscript received 18 Apr 77

SHVETSOVA, Ye. I., Laboratory of Functional Morphology of Lungs (Director G. S. Shishkin), Institute of Physiology, Siberian Branch of USSR Academy of Medical Sciences, Novosibirsk

[Abstract] The aim of this investigation was to study duration and peculiarities of trace effects of a short-term cold exposure (with and without disturbance of homeostasis) and to compare them with results of aftereffects of a prolonged acclimation to cold. Experiments were carried out in winter on

112 male albino rats weighing 200-300 g. They were divided into 5 groups: the 1st group (21) was cold exposed once, and the 2nd group (23) twice (two days in succession) at  $-20^{\circ}$ , with decrease of rectal temperature to  $30^{\circ}$ ; rats in the 3rd group (32) were subjected to intermittent cold exposure at  $-20^{\circ}$  (15 times for 2 min, with 5 min intervals of warming at room temperature, with no change in rectal temperature; the 4th group (19) was kept for 4-5 weeks at a constant temperature of  $+2$  to  $+4^{\circ}$ ; the 5th group (17) served as control. Vestigial heat control responses were investigated after 1, 5, 10 and 30 days following cessation of cold exposure. The data obtained show that consumption of oxygen at  $+20-25^{\circ}$  ambient temperature of experimental rats of all groups at various periods after cold exposure did not differ from that in control ones. On decrease of ambient temperature the gaseous metabolism in animals of various groups increases unequally. The intensity of chemical thermoregulation expressed on a percentage basis per degree of change in ambient temperature is lowest in control rats and somewhat higher in experimental animals within 30 days after cold exposure. Figures 3; table 1; references 20: 14 Russian, 6 Western. [239-1015]

UDC 612.041.41

#### RESPIRATORY CHANGES IN RABBITS UNDER HIGH PRESSURE NITROGEN-OXYGEN MIXTURES

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian No 1, 1979 pp 82-87

TROSHIKHIN, G. V., BATYGINA, V. N., and DONINA, Zh. A., Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad

[Abstract] An investigation was made of the effects of normoxic nitrogen-oxygen mixtures under increased pressure on rabbit respiration, as well as on the electrical activity of respiratory muscles, arterial oxyhemoglobin levels, and free oxygen concentration in the cerebral cortex. The results showed that an increase in the pressure of the normoxic mixture ( $P_{O_2} = 0.2$  kgs/cm<sup>2</sup>) to 6 kgs/cm<sup>2</sup> (10 min exposure), 10 kgs/cm<sup>2</sup> (10 min), 20 kgs/cm<sup>2</sup> (1 h), 30 kgs/cm<sup>2</sup> (10 min), and 40 kgs/cm<sup>2</sup> was accompanied by a decrease in pulmonary ventilation, increase in respiratory work (0.014 kpm at atmospheric pressure, 0.078 kpm at 10 kgs/cm<sup>2</sup>, to 0.135 kpm at 40 kgs/cm<sup>2</sup>), and enhancement of electrical activity of the respiratory muscles. At 20-30 kgs/cm<sup>2</sup> arterial oxyhemoglobin levels and free oxygen concentration in the cerebral cortex began to decline, while exposure to 40 kgs/cm<sup>2</sup> led to cessation of respiration and death in 10-30 min. It appears that for this species gas density of 51.29 g/L prevalent at 40 kgs/cm<sup>2</sup> is incompatible with respiratory activity. Figures 3; references 17: 6 Russian, 11 Western. [207-12172]



## ENERGY METABOLISM DURING RECOVERY FROM PHYSICAL FATIGUE

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR in Russian No 1, 1979 pp 128-132

BATUNER, L. S., Biochemistry Section, Leningrad Scientific Research Institute of Physical Culture

[Abstract] A study was made of the energy metabolism of the muscles of lower extremities of adult albino rats to determine metabolic recovery from physical fatigue. Determinations of the ATP, ADP, ATP/ADP ratio, lactate, pyruvate, lactate/pyruvate ratio, beta-hydroxybutyrate, acetoacetate and the beta-hydroxybutyrate/acetoacetate ratio in control rats, as well as rats subjected to rapid-onset and slow-onset fatigue, and rats subjected to physical exertion without fatigue, demonstrated that recovery of energy stores proceeds much more slowly in fatigued animals. In addition, animals subjected to slow-onset fatigue had the lowest metabolism for up to 24 h. Tables 1; references 14: 5 Western, 9 Russian.  
[207-12172]

## HUMAN FACTORS

### THE PSYCHO-PHYSIOLOGICAL MECHANISM OF HUMAN ERROR REACTIONS UNDER CONDITIONS OF VISUAL STIMULATOR INTERACTION

Moscow VOPROSY PSYKHologii in Russian No 6, 1979 pp 86-95

LOKALOVA, N. P., Scientific Research Institute of General and Pedagogical Psychology, USSR Academy of Psychological Sciences, Moscow

[Abstract] Using the Chuprikova method, the psychophysiological mechanism of the appearance of regular error reactions was studied in detail, under conditions of sensory motor interactions. The test subject was supposed to react with the right hand in response to a one-lamp signal and with the left hand- to a two-lamp signal. Even though errors were observed after primary and secondary stimulations, the secondary responses included more errors. A tendency was noted to duplicate the response to the previous signal when common lamps were used as stimuli. Also, if the lamps used were different in both tests, different reactions were observed, even to analogous stimuli. The reason for these errors is the sequential stimulation of nervous structures participating in the realization of the first motor reaction. The tendency to react twice with the same hand appears during repeated stimulation of an already stimulated network segment, and of the brain structure. When different segments are stimulated, different hands react. The cause for the first reaction is the insufficiency of integrative inhibition. A response of the second type occurs as a result of temporal immunity of a certain group of sensory neurons. Figures 2; references 20: 16 Russian, 4 Western.

[196-7813]

# OPTIMIZATION OF OPERATOR PERFORMANCE ON THE BASIS OF PARTIAL ERROR ANALYSIS

Moscow TEKHNIЧЕСКАЯ ЭСТЕТИКА in Russian No 12, 1979 pp 20-21

NOSOV, N. A., Psychologist, Moscow State University

[Abstract] An evaluation was made of the rare failure of pilots and flight technicians to lower the landing gear on landing, a situation described as an "impossible error." The results of the analysis showed that a key factor in further decreasing the incidence of such flight personnel errors is the implementation of a signal system that is both specific (e.g., light signal) and active (e.g., a sound signal) and not subject to being overridden or disconnected by the personnel involved in lowering the landing gear.

[1840-12172]

UDC 612.833.81

# ELECTROPHYSIOLOGICAL CORRELATES OF TRAINING HUMAN OPERATORS

Moscow FIZIOLOGIYA CHELOVEKA in Russian No 6, 1979 pp 1046-1051 manuscript received 5 Oct 1977

KAMENSKAYA, V. G. and MESAROSH, I., The A. A. Zhdanov Leningrad State University, and the E. Loranda Budapest University, Hungary

[Abstract] Under sound-proof conditions 10 subjects were exposed to tones of 30 ms duration, 1.0 kilohertz frequency and 60-65 decibels, along with flashes of a gas-discharge lamp. The times between pairs of stimuli was varied from 2 to 10 seconds following an equal distribution pattern. Sound tones alone were distributed in a random manner during the paired repetitions. Reactions were measured using silver chloride electrodes at the frontal, sensory motor and temple zones of the cortex and an inert electrode at the ear lobe. Both passive and active attention situations were used in the experiments, with the subject instructed to turn off the light flash in the active variant 400 ms from the start of the tone. Data obtained were processed statistically. No expectancy waves were recorded in any of the passive attention tests, but clear conditioned responses were recorded. During active attention variants an expectancy wave was recorded in the frontal and sensory motor zones. Mean conditioned response increased with amplitude in the frontal cortex, but decreased in the temporal zone. Figures 4; references 11: 5 Russian, 6 Western.

[200-12131]

## AN EXPONENTIAL APPROXIMATION OF CURVES IN A PROCESS OF TRAINING VISUAL PERCEPTION

Moscow FIZIOLOGIYA CHELOVEKA in Russian No 6, 1979 pp 1038-1045 manuscript received 19 Apr 77

TURKINA, N. V., Leningrad Branch of the All-Union Scientific Research Institute for Technical Esthetics

[Abstract] Letters of the Russian alphabet and geometric shapes were presented on a screen in various groups to 4 subjects with normal vision, who had first been familiarized with the stimuli. Length of exposition was varied, and the results of training were recorded. Results showed that increased repetitions brought a decrease in the time needed for correct identification. To test the adequacy of the approximation, data were processed by computer using the sum of the least squares and standard deviation of actual results from theoretical calculations. Analysis showed that training was slowed by presenting more letters of the alphabet in a fixed time, training took longer when the period of exposition was reduced for an item, and maximum achievement also declined with reduced exposition time. Graphoanalytic processing methods were shown to be applicable to the data evaluated. Figures 4; references 17: 13 Russian, 4 Western.  
[200-12131]

## EVALUATION OF THE MOTOR ACTIVITY OF SEAMEN WORKING ON VESSELS OF THE ICEBREAKER FLEET

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 12, 1979 pp 40-42 manuscript received 20 Feb 79

TITKOV, Yu. S. and TSYLIN, A. I., Leningrad

[Abstract] The increase in the duration of the average cruise has resulted in an increase in the importance of the attendant constraints on motor activity of personnel. In this connection the motor activity of an icebreaker crew was investigated in relation to the effect of their sports activities (gym room, sauna, swimming pool) on the functional state of the cardiovascular system. Motor activity was determined by the pedometric method, on measuring the number of steps taken daily by crew members on deck during a prolonged Arctic voyage. The 85 crew members were divided into two groups, one

taking physical exercise (22 subjects), and the other avoiding exercise (63 subjects). The daily number of steps by the average crew member was 5,292+176. Following a 6-month nonstop cruise the number of persons engaging in sports activities was found to diminish to 25% of the original number. EKG studies revealed that after the end of the cruise pathological EKG changes (disturbances in repolarization processes) occurred only among subjects not engaging in physical exercise. It was only among the latter group of subjects, too, that instances of increase in arterial pressure were recorded. It is thus concluded that, against the general background of enhanced hypokinesia, physical exercise strengthens the resistance of the cardiovascular system to the unfavorable effects of lengthy ship cruises. Another factor to be considered is that in the course of a lengthy cruise the number of persons regularly engaging in physical exercise decreased to one-fourth of the original number. References: 4 Russian.  
[215-1386]

UDC 613.68

#### WORK STRESS EVALUATION IN CAPTAINS OF "RAKETA" HYDROFOIL BOATS

Moscow GIGIYENA TRUDA in Russian No 11, 1979 pp 47-49

STEN'KO, Yu. M. and STAMBOL'SKIY, B. N., Institute of Water Transportation Hygiene, Moscow

[Abstract] The EKGs of captains operating the "Raketa" hydrofoil boats in the Moscow Oblast were evaluated to assess the extent of occupational stress under various conditions. The results showed the absence of significant deviations in PQ, QRS, and QT, although PQ tended to be prolonged. The most pronounced changes on the EKGs related to occupational stress were in the heart rate, reaching 115-120 beats/min in some cases, and deviations in the systolic index and the P/T and T/R indexes. Tables 1; figures 1; references 7: 6 Russian, 1 Western.  
[188-12172]



## HUMAN FACTORS IN THE PLANNING OF INFORMATION SYSTEMS

Moscow TEKHNIЧЕСKAYA ESTETIKA in Russian No 10, 1979 pp 25-27

BEREZKIN, B. S., candidate of technical sciences, DRAKIN, V. I., doctor of technical sciences, and LEPSKIY, V. Ye., candidate of psychological science, Moscow

[Abstract] A review is presented of the current state of information systems design, particularly from the psychological viewpoint in terms of user needs. Emphasis is placed for the need of management psychology, a discipline still in its infant phase, which will encompass man-machine, man-man, and man-collective interactions. The latter is especially important in the socialist countries where the individual functions in concert with the collective. An equally important factor in the design of information systems and its interface with the user is the replacement of intuitive activity by logical mechanisms based on reflexive considerations. Figures 1; references 11: 9 Russian, 2 Western.

[183-12172]

## EXPERIENCE IN STUDYING STRATEGIES OF DESIGN PLANNING OF COMPUTER EQUIPMENT

Moscow VOPROSY PSIKHOLOGII in Russian No 3, May/Jun 79 pp 87-95

BONDAROVSKAYA, V. M., and RYBALKA, V. V., Kiev

[Abstract] A study is made of the strategies of topologic planning oriented toward solution of the psychological problems arising in the design and operation of dialogue automatic planning systems. An attempt was made to study one type of practical mental activity in order to obtain data for the solution of psychological problems arising the design and operation of dialogue automated systems. The strategy of effective planning was defined as the basis of solution of the psychological problems arising in organization of the combined operation of a computer and its user. The studies performed were intended to solve problems of organization of the activity of designers refining plans made by a computer in the dialogue mode of operation with the computer. Figures 4; references 20: 15 Russian, 5 Western.

[195-6508]

## **THEORETICAL, METHODOLOGIC AND APPLIED ASPECTS OF THE PROBLEM OF PERCEPTION OF TIME**

**Moscow VOPROSY PSIKHologii in Russian No 3, May/Jun 79 pp 16-24**

**CHUPRIKOVA, N. I., and MITINA, L. M., Scientific Research Institute of General and Pedagogic Psychology, USSR Academy of Psychological Sciences, Moscow**

[Abstract] Studies to determine the individual regularities of time perception are rather widespread, but no "time recognition" mechanism has yet been discovered. As many as 100 biological clocks (oscillators) have been discovered in the human organism, but it cannot yet be said which of these oscillators is used in what manner to perceive and measure time intervals. Most experimental studies in the area of time perception are descriptive, empirical in nature. The authors call for ordering of the conceptual and terminological apparatus of the field as a first step in construction of a psychological theory of time perception. Different studies have used different methods of measuring time perception, from attempts to reproduce very short time intervals to attempts to guess or measure time intervals of varying length, with subjects used to perform various tasks over times stretching from milliseconds to days. It is quite probable that different mechanisms are used in the human body to perform different time-related tasks over different lengths of time. Therefore, order and structure must be brought to the system of psychological testing and time evaluation before meaningful results can be achieved which can be applied to improvement of such important structures as man-machine system operation. References 16: 10 Russian, 6 Western.  
[195-6508]

## **A DEFINITION OF THE ORIENTATION REACTION CONCEPT IN MAN**

**Moscow VOPROSY PSIKHologii in Russian No 3, May/Jun 79 pp 35-46**

**KOCHUBEY, B. I., Scientific Research Institute of General Pedagogic Psychology, USSR Academy of Psychological Sciences, Moscow**

[Abstract] This article analyzes the basic theoretical concepts relating to the orientation reaction in man. Two basically different points of view are distinguished: that which analyzes this reaction as a response to changes in information characteristics in stimuli; and that which considers the orientation reaction as a reaction of formation of any new activity in response to a change in environmental parameters significant to the individual. After presenting some factual data on the development and dynamics of the

orientation reaction, the author presents a theory of the nervous model of the stimulus and notes that the orientation reaction does not occur when an indifferent stimulus changes. Concepts which relate the orientation reaction to conditioned reactions are reported and some considerations are presented on the concept of orientation activity. The author does not consider it justified to extend the term orientation reaction to all processes of reorganization of behavior. The author distinguishes the "motivational component" and the "orientation component" in a typical orientation reaction. No true orientation reaction occurs without a motivational component. References 68: 22 Russian, 46 Western.  
[195-6508]

## PSYCHOLOGY

### RELIABILITY OF PSYCHOLOGICAL TESTS AND MEANS OF IMPROVING THEM

Moscow VOPROSY PSIKHOLOGII in Russian No 3, May/Jun 79 pp 96-105

GIL'BUKH, Yu. Z., UkrSSR Scientific Research Institute of Psychology, Kiev

[Abstract] Validity and reliability are the two most important criteria of psychological tests. If a test is unreliable, if repeated measurements using the same tests yield different results, one cannot be sure of the validity of the test results. The author limits his analysis to two problems: 1) more precise specification of individual aspects of reliability and 2) analysis of factors creating measurement error and, based on this analysis, determination of certain methods of increasing the reliability of psychological tests. After a general discussion of the conceptual reliability, the author analyzes factors creating measurement error in psychological testing. He concludes that estimation of a test on the basis of the criterion of reliability should be performed considering the purpose of the test, the validity of the test and the specific peculiarities of its design. References 27: 13 Russian, 14 Western.  
[195-6508]

### SPECIAL CONTROL SOFTWARE AND PROBLEMS OF PSYCHOLOGY

Moscow VOPROSY PSIKHOLOGII in Russian No 3, May/Jun 79 pp 3-9

DAVYDOV, V. V., Scientific Research Institute of General Pedagogic Psychology, USSR Academy of Psychological Sciences, Moscow

[Abstract] The process of automation of industry is proceeding rapidly in the USSR. At the present time, the solution of contemporary administrative problems cannot be separated from the process of mathematization of science. In a recent book by M. I. Gvardeytshev, "Special Administrative Software," the problem of integration of the science of control of social development is discussed. This article, while not a book review, discusses the basic ideas of this book and relates them to current problems of administrative

psychology. The book discusses the problem of the tremendous capacity of humans to act through control systems and the limited real-time decision making capabilities which must be used to control these actions. The subject of psychological research in control is defined as a complex of laws and mechanisms of internal organization of the social system which are manifested in the process of control of groups of persons working in teams. The creation of administrative software is considered quite promising as a means of unifying systems which control equipment, systems which administer enterprises and branches of industry and scientific and technical information systems, essentially information-retrieval systems. The creation of such integrated administrative systems requires the joint and coordinated efforts of representatives of various sciences, including psychology, which must play a leading role in this work. References: 8 Russian.  
[195-6508]

UDC 612.821.6+591.552

NEW MODEL FOR STUDY OF GROUP TRAINING IN MICE (SYNTHESIS OF CONDITIONED-REFLEX AND ETHOLOGICAL APPROACHES)

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 29, No 6, Nov/Dec 79 pp 1193-1198 manuscript received 13 Jun 78

POSHIVALOL, V. P. and YAVICH, L. B., First Medical Institute imeni I. P. Pavlov, Leningrad

[Abstract] Two separate, distinct approaches are cited as being used in study of behavior in animals--the conditioned-reflex method (which achieves clear, quantitative results in various training tasks) and the ethological method (which permits evaluation of qualitative aspects of behavior and of its intraspecific meaningfulness). The present work was undertaken to devise a model for study of group training using an integration of both approaches. It involved study of the capacity of animals for joint training depending on hierarchical relationships in the group and on the possibility of modulation of completion of an avoidance reaction (AR) by the group via pharmacological and psychophysiological influence (on the group as a whole and on its individual representatives--the dominant and the inferior members of a group). Mice were used in this study and were placed in a two-compartment box; the floor of one compartment could give an electric shock. The compartments were separated by a door which automatically opened into the "safe" compartment; this door opened when a bell sounded, portending the coming shock. The mice could be taught to avoid the shock (the AR) by going into the safe section. Two groups of mice were used: one group



(an aggressive group wherein dominant animals attacked the less aggressive) displayed much hostile interaction, the other, a peaceful group, showed no conflict. The peaceful group learned the AR faster than the aggressive group; it also tended to huddle together as an aggregation. In the aggressive group, the dominant animal learned the AR better than its fellows which were subjected to attack if they ventured movement to avoid the shock. When the aggressive animals formed an aggregate, the dominant animal would attack those outside the aggregate. As individuals, a peaceful animal learned slower than it did in the group. Dominants, well-trained in AR, also displayed superior responses when tested along with a less-well-trained dominant. "Status" gained by execution of the AR also seemed to reinforce AR ability. Diazepam negated the dominant's ability to depress its fellows' learning ability. Also, when peaceful animals were housed in the compartment with aggressive animals, their AR was depressed. It is thought that psychotropic agents can be exploited to improve group learning of an AR. Figures 5; references 5: 1 Russian, 4 Western.  
[173-8586]

UDC 616.12-008.331.1-08-036.8:612.821

#### BEHAVIORAL FACTORS IN THE PROBLEM OF TREATMENT OF PERSONS WITH ARTERIAL HYPERTENSION

Moscow KARDIOLOGIYA in Russian No 12, 1979 submitted 13 Jun 79 signed to press 23 Nov 79 pp 11-15

SHKHVATSABAYA, I. K., deputy director, All-Union Cardiological Center, USSR Academy of Medical Sciences, Moscow

[Abstract] A discussion of the importance of psychological factors in control and treatment of hypertension emphasized the importance of the attitude of the public toward their personal health and their acceptance of medical care and described the reduction of effectiveness of hypertension detection and control programs as a result of such attitudes. The role of psychological factors in pathogenesis of essential hypertension is described and discussed and the personalities of persons with different forms of hypertension are described. A comprehensive, multidisciplinary approach to control of hypertension was recommended with use of traditional hypotensive agents, beta-blockers, psychotropic agents and relaxation technique, methods of casual-pathogenetic psychotherapy and adjustment of social and personal behavior. References: 10.  
[176-2791]

## STUDIES OF THE INTELLECTUAL FUNCTION OF TWINS. 1. DEVELOPMENTAL CHARACTERISTICS

Moscow GENETIKA in Russian No 1, 1980 pp 165-175

KANTONISTOVA, N. S., Institute of Child and Adolescent Hygiene, USSR Ministry of Health, Moscow

[Abstract] The Wechsler Intelligence Scale for Children was employed in evaluating the level of intellectual development of 122 monozygotic and 112 dizygotic twins, 7 to 16 years of age; control data were obtained for 100 singlets. The study was conducted during the 1973-1975 period in Moscow; most of the subjects were Russian by nationality. The results demonstrated that the twins were on a lower intellectual level than the singlets largely as a result of poor showing on the verbal tests. This was attributed to organic changes in the nervous system resulting from an adverse antenatal environment. In addition, there was a correlation between low birth weight and intellectual impairment only if the weight was determined by unfavorable intrauterine factors. Moderate asphyxia, birth order, or prematurity did not influence intellectual development. Interaction between twins appears to exert a protective effect on the mental health status in an unfavorable home environment, while a positive intellectual climate at home favors intellectual development. Tables 6; references 19: 1 Russian, 18 Western. [245-12172]

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Sept. 29, 1980